HANDBOOK OF INSTRUCTIONS
FOR

TEST SET, CONTROL
QRC-133A(T)

the hallicrafters co.
4401 WEST 5TH AVENUE
Chicago 24, Ill.

CONTAINS 32 PAGES

HANDBOOK OF INSTRUCTIONS

FOR

TEST SET, CONTROL

QRC-133A(T)

CONTRACT NO. AF33(604)-21206

The Hallicrafters Company
4401 West Fifth Avenue
Chicago 24, Illinois

DATE: 14 July 1961

COPY NO.: 18

HLC NO.: 094-902933

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SECTION I

DESCRIPTION AND LEADING PARTICULARS

1-1. GENERAL.

1-2. This publication contains instructions for operation and maintenance of Test Set, Control QRC-133A(T), designed and manufactured by The Hallicrafters Company under Air Force Contract Number AF33(604)-21206.

1-3. PURPOSE OF EQUIPMENT.

1-4. Test Set, Control QRC-133A(T) enables maintenance personnel to test and maintain the frequency control module of Transmitting Set, Countermeasures QRC-133A(T). Test Set, Control QRC-133A(T) will test the reference voltage regulator, the chopper amplifier, the blower motor for proper rotation, and oven power and associated circuitry within the frequency control module.

1-5. DESCRIPTION OF EQUIPMENT.

1-6. Test Set, Control QRC-133A(T) is a self-contained equipment with the necessary circuitry and controls to simulate actual operating conditions for the frequency control module of the QRC-133A(T) Transmitting Set. It also contains seven meters for monitoring the operation. The test set is provided with two cables: a power cable for connecting the test set to a 115-volt AC, three-phase power supply; and a special purpose cable for connecting the test set to the frequency control module. Table 1-1 lists the equipment supplied and also gives the dimensions and weight of the test set.

TABLE 1-1. LIST OF EQUIPMENT SUPPLIED.

QUANTITY	COMPONENT	OVERALL DIMENSIONS (INCHES) (INCLUDING PROJECTIONS)			WEIGHT
		Height	Length	Width	
1	Test Set, Control QRC-133A(T)	11-1/2	21-1/2	17-3/4	48 pounds

TABLE 1-1. LIST OF EQUIPMENT SUPPLIED (CONT).

QUANTITY	COMPONENT	OVERALL DIMENSIONS (INCHES) (INCLUDING PROJECTIONS)			WEIGHT
		Height	Length	Width	
1	Cable Assembly, Power Electrical HLC#087-006841				
1	Cable Assembly, Special Purpose HLC#087-006842				

1-7. THEORY OF OPERATION

1-8. Test Set, Control QRC-133A(T) is used for testing the frequency control module of Transmitting Set, Countermeasures QRC-133A(T). Contained within the test set are the following: a low voltage power supply that supplies unregulated DC power to the minus 250-volt reference voltage regulator in the frequency control module; a detector that duplicates the detector circuit in the sole regulator of the QRC-133A(T) transmitter; a transformer that supplies power for the filaments of the tubes within the frequency control module; and a control that simulates the center frequency control on the control-indicator of the QRC-133A(T). Seven meters for monitoring the critical operating parameters of the frequency control module are incorporated in the test set. The test set enables maintenance personnel to check or adjust the following items:

a. Loading of the low voltage power supply.

b. Series regulator control voltage.

c. Sole regulator control voltage.

d. Stability of the system reference voltage regulator under high and low low line conditions.

e. Sole-to-anode tracking.

f. Blower motor

g. Reference tube oven.

h. Module interconnecting cable.

1-9. The test set requires a 115-volt AC, 400 cycle, 3-phase power supply for operation. For maintenance and testing instructions for the frequency control module, refer to the Handbook of Instructions for QRC-133A(T).

SECTION II

SPECIAL SERVICE TOOLS

2-1. SPECIAL SERVICE TOOLS.

2-2. No special service tools are required for Test Set, Control QRC-133A(T).

SECTION III

PREPARATION FOR USE

3-1. GENERAL.

3-2. This section contains instructions for unpacking and preparing Test Set, Control QRC-133A(T) for use.

3-3. PREPARATION FOR USE.

3-4. Test Set, Control QRC-133A(T) is packed with all meters installed. To prepare the test set for use, proceed as follows:

a. Remove the test set from its packing.

b. Examine the test set case for evidence of damage in shipment. Inspect for dents, scratches, and chipped or broken receptacles.

c. Remove the test set from the case and visually examine all components for signs of damage.

d. Clean and dry the equipment if evidence of extreme moisture is present.

e. Replace the test set in the case and fasten securely.

f. Remove the power cable and interconnecting cable from the cover of the case and examine for signs of physical damage.

If visual examination of the test set reveals no evidence of damage, the test set is ready for operation.

SECTION IV

OPERATING INSTRUCTIONS

4-1. GENERAL.

4-2. This section contains instructions for testing the frequency control module of the QRC-133A(T) transmitter with Test Set, Control QRC-133A(T).

4-3. PREPARATION FOR TESTING.

4-4. To prepare the frequency control module and the test set for testing, proceed as follows:

a. De-activate the transmitter.

b. Remove the frequency control module from the transmitter.

c. Remove the interconnecting and power cables from the cover of the test set.

d. Connect the interconnecting cable between J2 of the test set and connector P701 of the frequency control module.

e. Connect the primary power cable between receptacle J1 of the test set and a 115-volt AC, 400 cycle, 3-phase power source.

4-5. METERS AND CONTROLS.

4-6. The meters and controls necessary for testing the frequency control module are located on the front panel of the test set. An illustration of the front panel, showing location of meters and controls, is given in figure 4-1. The test set meters and their functions are listed in table 4-1. The test set controls and their functions are listed in table 4-2.

TABLE 4-1. TEST SET METERS.

METER	DESIGNATION	TYPE AND RANGE	FUNCTION
M1	ANODE OUTPUT	0-50 VDC Voltmeter	Measure series regulator control voltage.
M2	SOLE OUTPUT	0-300 VDC Voltmeter	Measures sole regulator control voltage.
M3	SOLE INPUT - ANODE INPUT	0-200 VDC Voltmeter (with selector switch)	Measures input anode center frequency control voltage or sole center frequency control voltage.

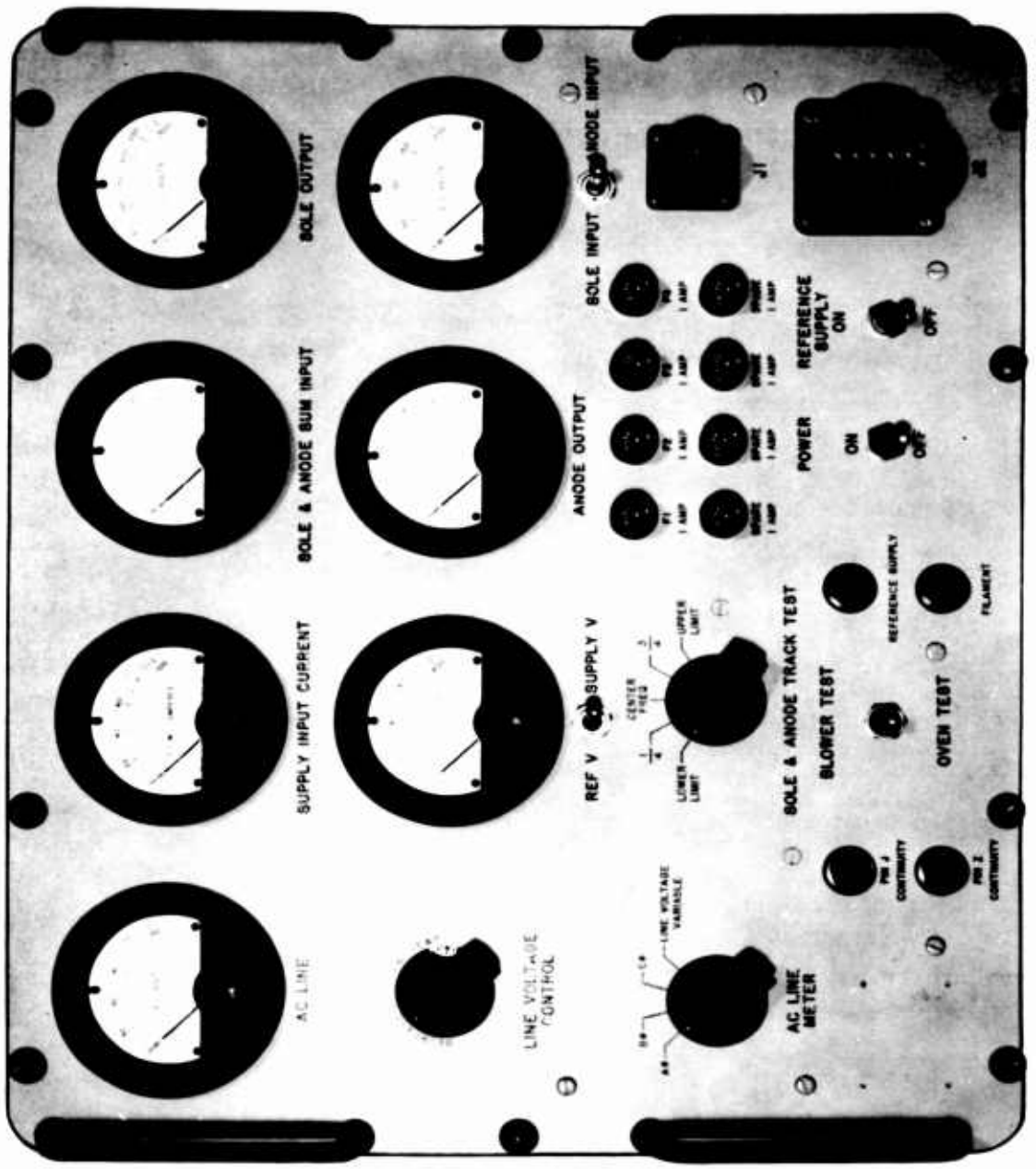

Figure 4-1. Test Set, Control QRC-133A(T), Front Panel.

TABLE 4-1. TEST SET METERS. (CONT)

METER	DESIGNATION	TYPE AND RANGE	FUNCTION
M4	SOLE & ANODE	0-300 VDC Voltmeter	Measures anode and sole input sum voltage.
M5	AC LINE	0-150 VAC Voltmeter (with selector switch)	Measures AC line input voltages.
M6	SUPPLY INPUT CURRENT	0-100 MA Milliameter	Measures low voltage power supply load current.
M7	REF V - SUPPLY V	0-800 VDC Voltmeter (with selector switch)	Measures low voltage power supply voltage and system reference voltage.

TABLE 4-2. TEST SET CONTROLS.

CONTROL	DESIGNATION	FUNCTION
S1	AC LINE	Permits switching of AC LINE meter M5 to test AC input voltages.
S2	BLOWER TEST - OVEN TEST	Tests blower motor and oven of frequency control module.
S3	REFERENCE SUPPLY ON-OFF	Applies unregulated power to reference voltage regulator of frequency control module.
S4	POWER ON-OFF	Applies primary power to the test set.
S5	SOLE & ANODE TRACK TEST	Duplicates center frequency control of QRC-133A(T) control-indicator.
S6	REF V-SUPPLY V	Permits measuring low voltage power supply voltage and system reference voltage.'
S7	SOLE INPUT - ANODE INPUT	Permits measuring input anode center frequency control voltage or sole center frequency control voltage.
T4	LINE VOLTAGE CONTROL	Tests stability of reference regulator against line variations by varying the input power to the frequency control module.

4-7. PRELIMINARY ADJUSTMENT OF TEST SET CONTROLS.

4-8. Before proceeding with testing of the frequency control module, make the following preliminary adjustments of the test set controls:

a. Set the LINE VOLTAGE CONTROL to the maximum counterclockwise position.

b. Set the AC LINE METER switch to LINE VOLTAGE VARIABLE position.

c. Set the POWER ON-OFF switch to ON position. Chopper operation should be heard at this time. All filaments of the tubes on the frequency control module, with exception of V704 in the oven, should light.

4-9. OPERATION OF TEST SET.

4-10. Refer to the Handbook of Instructions for QRC-133A(T) for operational instructions for the test set.

4-11. DE-ACTIVATING TEST SET.

4-12. De-activate the test set as follows:

a. Set the OVEN TEST switch to the OFF position.

b. Set the REFERENCE SUPPLY switch to the OFF position.

c. Set the POWER ON-OFF switch to the OFF position.

d. Disconnect the interconnecting cables from the frequency control module and the test set.

e. Disconnect the power cable from the power supply and the test set.

f. Store the interconnecting cables and power cable in the cover of the test set.

SECTION V

INSPECTION

5-1. GENERAL.

5-2. This section contains instructions for inspecting Test Set, Control QRC-133A(T). Inspection consists of visually inspecting components and connections for obvious defects. Any defect found must be repaired or the affected part replaced.

5-3. VISUAL INSPECTION.

5-4. Perform a thorough visual inspection of the equipment, its case, meters, and parts. Indicate on an inspection tag any damage, such as that listed in table 5-1, that is noticed.

TABLE 5-1. VISUAL INSPECTION CHECK LIST.

ITEM	CHECK
Cables	Not properly dressed
Capacitors	Damaged casings or broken leads
Casting	Cracked
Connectors	Bent pins; cracked inserts
Meter Covers	Cracked, dented, or distorted
Finish	Cracked or chipped
Insulation (Sleeving)	Worn or damaged
Variable Resistors	Cracked case or broken terminal leads
Control Knobs	Cracked or broken
Resistors	Cracked; broken; signs of overheating
Solder Connections	Insecure or broken
Terminals	Broken, loose, or missing
Toggle switch	Action and tightness
Wiring	Frayed or broken
Diodes	Cracked or damaged

SECTION VI

TROUBLESHOOTING

6-1. GENERAL

6-2. This section contains instructions for troubleshooting Test Set, Control QRC-133A(T).

6-3. TROUBLESHOOTING CHART.

6-4. A troubleshooting chart for the test set is contained in table 6-1. The first column lists symptoms which may occur. The middle column lists possible causes of the symptoms. The third column lists remedies for the troubles.

6-5. VOLTAGE AND RESISTANCE CHART.

6-6. A voltage and resistance chart to be used in conjunction with the trouble-shooting chart, is contained in table 6-2. The first column (PIN) lists the identifying symbol of the pins of receptacle J2 of the Test Set. The second column (VOLTAGE) lists the voltage as measured between each pin and ground. The third column (RESISTANCE) lists the resistance as measured between each pin and ground. Note 1 of the chart lists the proper position for each control of the test set during voltage measurements Note 2 of the chart gives instructions for checking for proper voltage output of the 390-volt DC power supply.

TABLE 6-1. TROUBLESHOOTING CHART

SYMPTOM	POSSIBLE CAUSE	REMEDY
No 390 VDC (Pin N to Pin P)	Defective transformer T3. Defective switch S3. Defective fuse F4. Defective transformer T4. Defective diodes (any diode CR3 through CR10).	Check and replace if necessary.

TABLE 6-1. TROUBLESHOOTING CHART (CONT)

SYMPTOM	POSSIBLE CAUSE	REMEDY
OVEN TEST-BLOWER TEST switch fails to cause operation of frequency control module oven and blower.	Defective switch S2. Defective fuse F1, F2, F3, or F4.	Check and replace. if necessary.
Filaments of tubes in frequency control module do not light	Defective transformer T1	Check and replace if necessary
SOLE OUTPUT meter inoperative.	Defective components in phase detector circuit (T2, R1 through R13, C1, C2, C3, C4, CR1, CR2)	Check and replace if necessary.
FUSE F4 opens	Short in frequency control module. Shorted capacitor C5. Shorted resistor R14.	Check and replace if necessary.

TABLE 6-2. VOLTAGE AND RESISTANCE CHART

PIN	VOLTAGE	RESISTANCE	
E	0 Volts	50K ohms	Note 1.
T	80	500K	For all voltage measurements, J1
J	80	INF	of the test set is connected to a
Z	90	INF	115 VAC, 3-phase power supply and
V	90	INF	the test set controls set to the
H	0	24.5K	following positions:
F	0	292K	POWER OFF-ON to ON
S	2	192K	OVEN BLOWER-TEST to BLOWER TEST.
U	0	118K	AC LINE METER to LINE VOLTAGE VARIABLE.
b	2	200K	SOLE & ANODE TRACK TEST to CENTER FREQ.
a	0	140K	LINE VOLTAGE CONTROL to counterclockwise.
Y	0	117K	REFERENCE SUPPLY to ON.
d	0	142K	
W	1.5	200K	
h	135	INF	
f	135	INF	Note 2.
X	0	INF	To check for 390-volt DC output,
e	140	5	it is necessary to first connect a
A	115	1.3	jumper wire between pin A and pin B of J2.
N	0	820K	This applies primary power to transformer T3.
M	0	0	
P	0	875K	
B	0	8	

SECTION VII

CALIBRATION

7-1. GENERAL.

7-2. This section contains instructions for calibrating Test Set, Control QRC-133A(T). Calibration consists of determining whether the indications of the test set meters are accurate.

7-3. METER CALIBRATION.

7-4. Test Set, Control QRC-133A(T) shall be calibrated at intervals of six months. Calibration is accomplished by checking the indications of the test set meters against the indications of a standard meter.

VIII

REPLACEABLE PARTS LIST

8-1. GENERAL.

8-2. This section contains the description and part number of each of the replaceable parts used in Test Set, Control QRC-133A(T). Reference symbols are identical to those component symbols indicated on the schematic diagram (figure 8-3) and on the illustrations of the test set. Figures 4-1, 8-1, and 8-2 illustrate the components of the test set.

8-3. MANUFACTURER'S CODE NUMBERS.

8-4. The code numbers listed below are used in the replaceable parts list to denote the manufacturers of specific parts. The code numbers were taken from the Federal Supply Code for Manufacturers (Cataloging Handbook H-4-1).

Code NO.	Vendors Name and Address
09922	Burndy Corp., Norwalk, Conn.
24455	General Electric Co., Lamp Division, Nela Park (Cleveland), Ohio
26916	Hallicrafters Co,, Chicago, Ill.
49956	Raytheon Mfg. Co., Waltham, Mass.
54294	Shallcross Mfg. Co., Selma, N. C.
56289	Sprague Electric Co., North Adams, Mass.
58474	Superior Electric Co., Bristol, Conn.
71279	Cambridge Thermionic Corp., Cambridge, Mass.
71400	Bussmann Fuse Division of McGraw-Edision Co., St. Louis, Mo.
72619	Dialight Corp., Brooklyn, N. Y.
81349	Military Specifications
96906	Military Standards

TABLE 8-1. REPLACEABLE PARTS LIST FOR TEST SET, CONTROL ORC-133A(T)

REF SYMBOL	FIGURE NO.	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.	FEDERAL STOCK NO.
C1	8-2	Capacitor, Fixed, Paper (0.5 uF, 10%, 600V)	81349	CP53B1EF504K1	495-535805-213	
C2	8-2	Capacitor, Fixed, Paper (0.1 uF, 10%, 600V)	81349	CP53B1EF104K1	495-534105-213	
C3	8-2	Same as C2				
C4	8-2	Same as C2				
C5	8-2	Capacitor, Fixed, Paper (2.0 uF, 10%, 600V)	81349	CP53B1EF205K1	495-536905-213	
C6	8-2	Capacitor, Fixed, Ceramic (10,000 uuF, 20%, 500V)	81349	CK63AW103M	047-001616	
C7	8-2	Same as C6				
C8	8-2	Same as C6				
C9	8-2	Same as C6				
C10	8-2	Same as C6				
C11	8-2	Same as C6				
C12	8-2	Same as C6				
C13	8-2	Same as C6				
CR1	8-2	Semiconductor Device, Diode	81349	JAN 1N547	019-002653	
CR2	8-2	Same as CR1				
CR3	8-2	Same as CR1				
CR4	8-2	Same as CR1				
CR5	8-2	Same as CR1				
CR6	8-2	Same as CR1				
CR7	8-2	Same as CR1				
CR8	8-2	Same as CR1				
CR9	8-2	Same as CR1				
CR10	8-2	Same as CR1				
DS1	8-2	Lamp, Glow (Neon)	24455	NE-51H	039-000654	
DS2	8-2	Same as DS1				
DS3	8-2	Same as DS1				
DS4	8-2	Same as DS1				
F1	8-2	Fuse, Cartridge (1 amp, 250 V)	81349	F02G1R00A	039-000609	
F2	8-2	Same as F1				
F3	8-2	Same as F1				
F4	8-2	Same as F1				
Spare	8-2	Same as F1				
Spare	8-2	Same as F1				
Spare	8-2	Same as F1				
Spare	8-2	Same as F1				
J1	8-2	Connector, Receptacle, Electrical	96906	MS3102E-18-4P	010-002135	
J2	8-2	Connector, Receptacle, Electrical	96906	MS3102E-32-7S	010-002136	
M1	8-2	Voltmeter, DC	81349	MR36W50DCVVR	082-000508	
M2	8-2	Voltmeter, DC (Special Scale)	26916		082-000544	
M3	8-2	Voltmeter, DC	81349	MR36W200DCVVR	082-000522	
M4	8-2	Same as M2				
M5	8-2	Voltmeter, AC	81349	MR36W150AFVVR	082-000506	
M6	8-2	Ammeter, DC	81349	MR36W100DCMAR	082-000524	
M7	8-2	Voltmeter, DC	81349	MR36W800DCVVR	082-000521	
P1	8-2	Connector, Plug, Electrical	96906	MS3106E-18-4S	010-002138	
P2	8-2	Connector, Plug, Electrical	96906	MS3106E-32-7P	010-002151	
P3	8-2	Connector, Plug, Electrical	96906	MS3106E-24-2P	010-002005	
P4	8-2	Connector, Plug, Electrical				
		consists of:				
		Body, connector receptacle	09922	MS34R	010-001882	
		Pin, connector receptacle	09922	MRC-20W-2	018-100625	
R1	8-2	Resistor, Fixed, Film (301K Ohm, 1%, 1W)	81349	RN70B3013F	440-113013-05	
R2	8-2	Same as R1				
R3	8-2	Resistor, Fixed, Film (2 Megohm, 1%, 1/2W)	81349	RN70B2004F	440-120205-00	
R4	8-2	Resistor, Fixed, Film (1 Megohm, 1%, 1/2W)	81349	RN70B1004F	440-120105-05	
R5	8-2	Resistor, Fixed, Film (249K Ohm, 1%, 1W)	81349	RN75B2493F	440-112493-08	
R6	8-2	Same as R5				
R7	8-2	Same as R1				
R8	8-2	Same as R1				
R9	8-2	Same as R3				
R10	8-2	Resistor, Fixed, Film (100K Ohms, 1%, 1/2W)	81349	RN70B1003F	440-120104-05	
R11	8-2	Resistor, Fixed, Wire Wound (7870 Ohm, 1%, 5W)	56289	Type RSA-224E	024-001384	
R12	8-2	Same as R11				
R13	8-2	Same as R11				
R14	8-2	Resistor, Fixed, Composition (2.2 Megohm, 5%, 1W)	81349	RC32GF225J	450-442225	
R15	8-2	Resistor, Fixed, Wire Wound (7500 Ohms, 1%, 5W	56289	Type RSA-244E	024-001385	

TABLE 8-1. REPLACEABLE PARTS LIST FOR TEST SET, CONTROL ORC-133A(T)

REF SYMBOL	FIGURE NO.	DESCRIPTION	MFR CODE	MFR PART NO.	HLC PART NO.	FEDERAL STOCK NO.
R16	8-2	Same as R15				
R17	8-2	Resistor, Fixed, Wire Wound (25K Ohms, 1%, 1W)	81349	RB19AE250001F	024-001386	
R18	8-2	Same as R17				
S1	8-2	Switch, Rotary (1 pole, 4 position)	54294	2J50A4-1X716	060-002321	
S2	8-2	Switch, Toggle (4 PDT)	96906	MS24525-21	060-002355	
S3	8-2	Switch, Toggle (SPST)	96906	MS35058-22	060-002323	
S4	8-2	Switch, Toggle (4 PDT)	96906	MS24525-22	060-002352	
S5	8-2	Switch, Rotary (2 pole, 5 position)	54294	2J06A5-1	060-002326	
S6	8-2	Switch, Toggle (SPDT)	96906	MS35058-23	060-002325	
S7	8-2	Same as S6				
T1	8-2	Transformer, Power, Step-Down	81349	Type TF5RX01ZZ	052-000885	
T2	8-2	Transformer, Power, Rectified Load	81349	Type TF5TY10ZZ	055-000448	
T3	8-2	Transformer, Power, Step-Up	81349	Type TF6TY02ZZ	052-000842	
T4	8-2	Transformer, Variable (115 vac, 400 cps, single phase primary, 0-140V output)	58474	1HS01CK	052-000886	
XDS1	8-2	Light, Indicator (Red)	72619	95408-H-931	039-000643	
XDS2	8-2	Same as XDS1				
XDS3	8-2	Same as XDS1				
XDS4	8-2	Same as XDS1				
XF1	8-2	Fuseholder, Extractor Post Type	71400	HKP-HZ	006-000968	
XF2	8-2	Same as XF1				
XF3	8-2	Same as XF1				
XF4	8-2	Same as XF1				
Spare	8-2	Same as XF1				
Spare	8-2	Same as XF1				
Spare	8-2	Same as XF1				
Spare	8-2	Same as XF1				
		Cable Assembly (Includes P1 and P3)	26916		087-006841	
		Cable Assembly (Includes P2 and P4)	26916		087-006842	
		Case Assembly	26916		150-001915	
		Ferrule, Handle	71279	1988-BO	077-002613	
		Knob, Round, Skirted Pointer	49956	70-8-2G	015-001584	
		Handle, Bow	71279	X1075	030-000722	

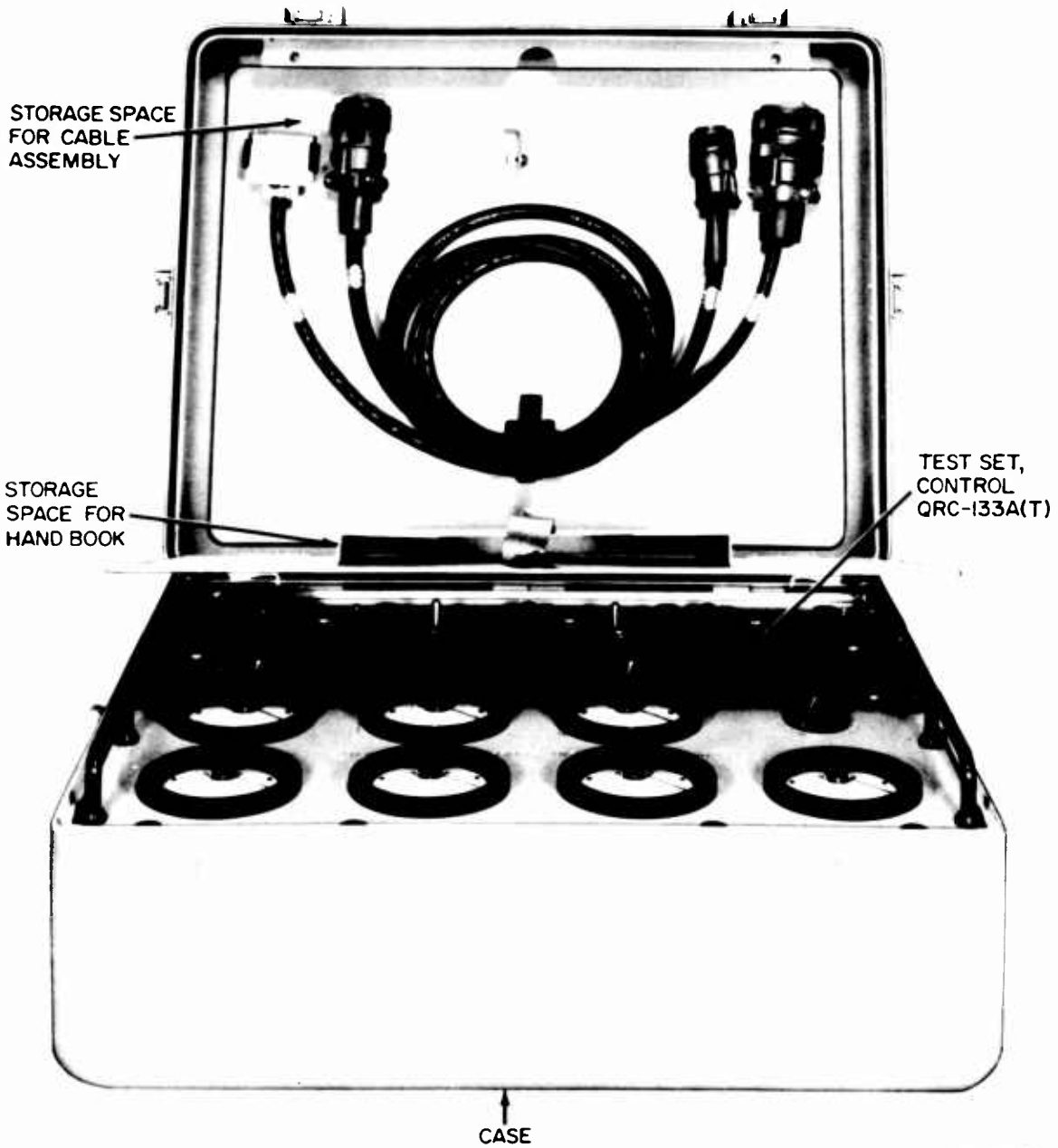

Figure 8-1. Test Set, Control QRC-133A(T), Cover Open.

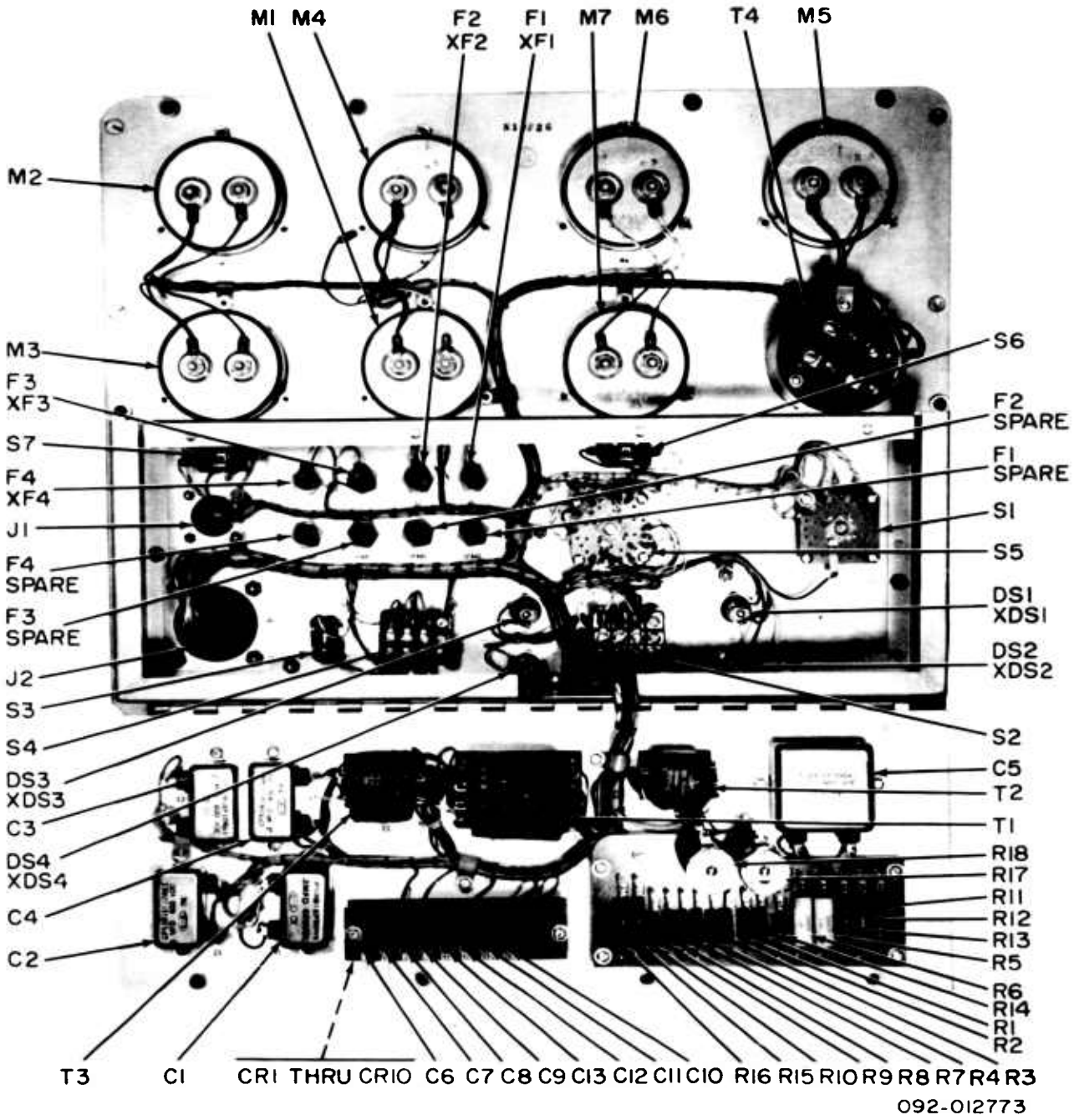

Figure 8-2. Test Set, Control CRC-133A(T), Bottom Exposed View.

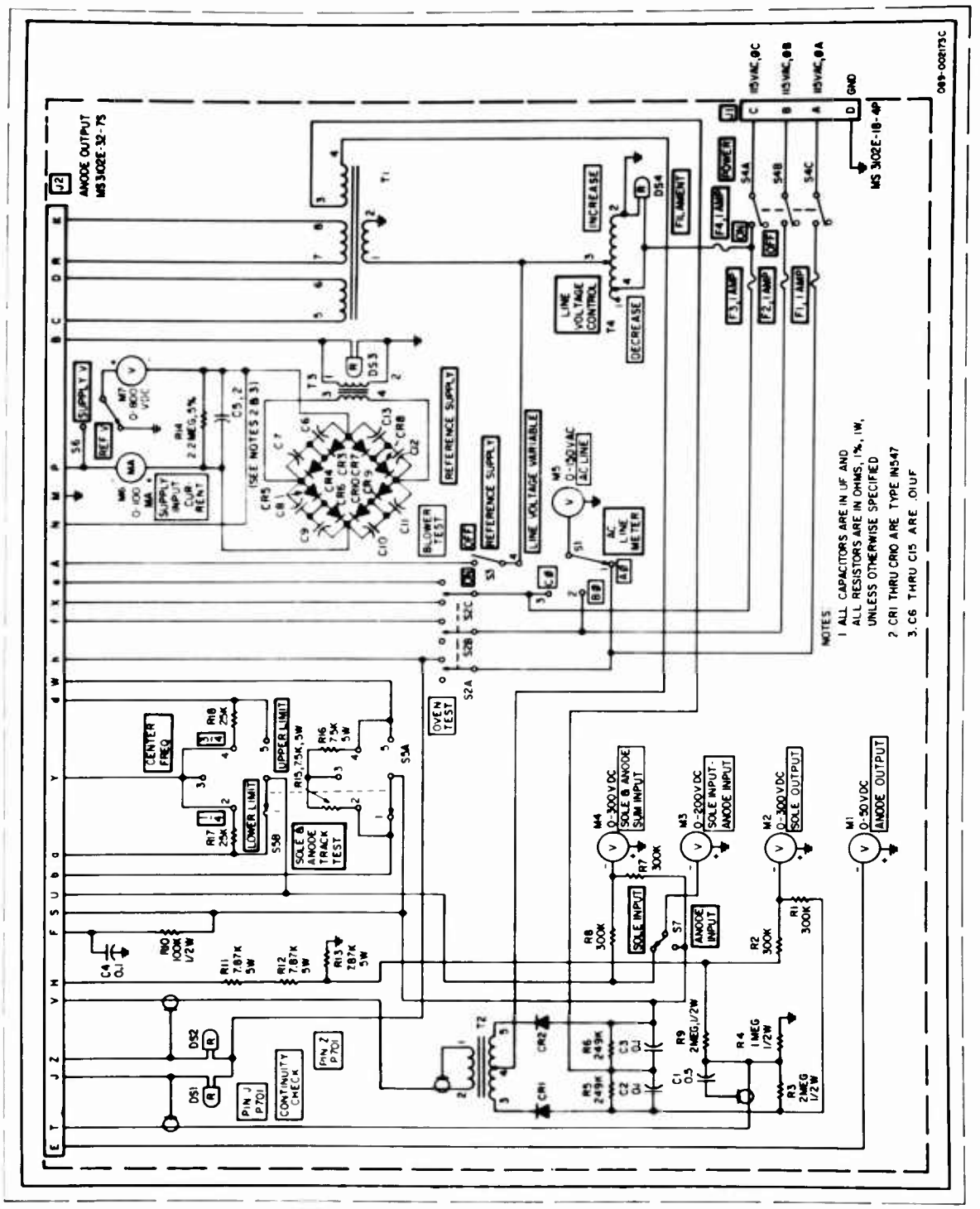

Figure 8-3. Schematic Diagram, Test Set, Control CRC-133A(T).